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(54) **DOUBLE SURFACE GRINDER FOR THIN CIRCULAR WORKPIECE**

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a double surface grinder for a thin circular workpiece capable of grinding at high precision regardless of thickness reduction of the workpiece.

SOLUTION: This grinder is provided with a pair of grinding wheels 8, 9 disposed in such a way that their end grinding surfaces face each other, and that they are relatively moved to each other in the axial directions, and a workpiece rotating means provided to support a workpiece at a grinding position between the grinding surfaces to be rotated so that both surfaces of the workpiece to be worked respectively face the grinding surfaces of the grinding wheels 8, 9, that an outer circumference of the workpiece crosses outer circumferences of the grinding surfaces, and that the center of the workpiece is positioned inside the grinding surfaces. The rotating means is provided with hydrostatic type axial direction support means 10, 11 to supply fluid from between the grinding wheels 8, 9 to both surfaces of the workpiece to be worked at outer parts for contactlessly supporting the workpiece in the axial directions. The hydrostatic type axial direction supporting means 10, 11 are provided with a hydrostatic control means 13 for keeping hydrostatic pressure constant to correspond to reduction of thickness of the workpiece as grinding goes on.

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CLAIMS

[Claim(s)]

[Claim 1] Double-sided grinding attachment of a sheet metal discoid work provided with a static pressure control means characterized by comprising the following to which a static pressure type axial supporting means keeps a static pressure constant in double-sided grinding attachment of a discoid work corresponding to reduction of thickness of a work accompanying advance of grinding.

One pair of grinding stones which are arranged and are rotated so that it can move relatively to shaft orientations, while the circular grinding sides of the end face counter. While a processed surface of both sides of a sheet metal discoid work counters a grinding side of one pair of said grinding stones, respectively. It has a work rotation means which makes a grinding position between said grinding sides rotate in support of said work so that a periphery of said work may intersect a periphery of said grinding side and the center of said work may be located in said grinding side, A static pressure type axial supporting means which said work rotation means supplies a fluid to a processed surface of both sides of a portion of a work which has come from between said grinding stones outside, and carries out non-contact support of said work with the static pressure in shaft orientations.

A diameter direction support driving means which makes a diameter direction rotate in support of said work.

[Claim 2] It has a fluid supply member of a couple which has a field where a static pressure type axial supporting means counters a field of a portion of a work which has come from between said grinding stones outside, respectively, A static pressure control means has a transportation device which moves at least one fluid supply member to shaft orientations of a work, When a transportation device has a fluid pressure cylinder and a rod of said fluid pressure cylinder is extended corresponding to reduction of thickness of a work accompanying advance of grinding, Double-sided grinding attachment of the sheet metal discoid work according to claim 1 currently making as [keep / a static pressure / at least one fluid supply member moves to shaft orientations of a work, and / constant].

[Claim 3]. Do so that you have a vacuum suction device connected to one fluid supply member and only a fluid supply member of another side moves by a fluid pressure cylinder. Double-sided grinding attachment of the sheet metal discoid work according to claim 2 currently making as [hold / it / where a work before a grinding start and after an

end of grinding is adsorbed].

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the double-sided grinding attachment of a sheet metal discoid work, and the device which grinds simultaneously both sides of sheet metal discoid works, such as a semiconductor wafer, still more detailed, for example.

[0002]

[Description of the Prior Art] As a device which grinds both sides of a sheet metal discoid work simultaneously, JP, 10-217079, A has a thing of a statement, for example.

[0003] The perpendicular disc-like grinding stone of a couple with which this grinding attachment keeps an interval in right and left at the upper surface of a level bed and a bed, it is provided, and the field which countered is made with a grinding side, respectively. While both sides of a sheet metal perpendicular discoid work counter the grinding side of a grinding stone, respectively, it has the work piece rotating device which makes the grinding position between grinding sides rotate in support of a work so that the periphery of a work may intersect the periphery of a grinding side and the center of a work may be located in a grinding side.

[0004] The work piece rotating device is provided with the direction means for supporting of a static pressure shaft which supply a fluid to both sides of the portion of the work which has come from between grinding stones outside, and carry out non-contact support of the work with the static pressure in shaft orientations, and the diameter direction support drive which a diameter direction is made to rotate in support of a work.

[0005] It has the support block with which the slit which can insert a work was formed, fluids, such as air, blow off from both sides of the block which forms a slit, and the direction means for supporting of a static pressure shaft are made as [support / by the static pressure produced with this fluid / a work].

[0006]

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional grinding attachment, it cannot respond to change of the thickness of the work accompanying grinding. That is, since a static pressure will become low and a work will become

unstable if grinding advances and the thickness of a work decreases, there is a problem that the grinding accuracy of a work becomes low and the flatness of the processed surface of a work becomes low.

[0007]The purpose of this invention is to provide the double-sided grinding attachment of the sheet metal discoid work which makes it a technical problem to solve the above-mentioned problem, and is not concerned with reduction of the thickness of a work, but can grind in high accuracy.

[0008]

[The means for solving a technical problem and an effect of the invention] In order to solve an aforementioned problem, the double-sided grinding attachment of the sheet metal discoid work of this invention, One pair of grinding stones which are arranged and are rotated so that it can move relatively to shaft orientations, while the circular grinding sides of the end face counter, While the processed surface of both sides of a sheet metal discoid work counters the grinding side of one pair of said grinding stones, respectively. It has the work rotation means which makes the grinding position between said grinding sides rotate in support of said work so that the periphery of said work may intersect the periphery of said grinding side and the center of said work may be located in said grinding side, The static pressure type axial supporting means which said work rotation means supplies a fluid to the processed surface of both sides of the portion of the work which has come from between said grinding stones outside, and carries out non-contact support of said work with the static pressure in shaft orientations, In the double-sided grinding attachment of a sheet metal discoid work provided with the diameter direction support driving means which makes a diameter direction rotate in support of said work, it has the static pressure control means to which a static pressure type axial supporting means keeps a static pressure constant corresponding to reduction of the thickness of the work accompanying advance of grinding.

[0009]In double-sided grinding attachment of this sheet metal discoid work, since a value of a static pressure which is not concerned with change of thickness of a work but holds a work is kept constant, both sides of a sheet metal discoid work can be ground in high accuracy.

[0010]In double-sided grinding attachment of the above and a sheet metal discoid work, a static pressure type axial supporting means, It has a fluid supply member of a couple which has a field which counters a field of a portion of a work which has come from between said grinding stones outside, respectively, A static pressure control means has a transportation device which moves at least one fluid supply member to shaft orientations of a work, When a transportation device has a fluid pressure cylinder and a rod of said fluid pressure cylinder is extended corresponding to reduction of thickness of a work accompanying advance of grinding, at least one fluid supply member moves to shaft orientations of a work, and it may be made as [keep / a static pressure / constant].

[0011]In this device, while a static pressure control means is realizable with simple composition, a static pressure can be easily kept constant, and control of a static pressure can be ensured. .

[0012]It may be made as [move / the above-mentioned double-sided grinding attachment is provided with a vacuum suction device connected to one fluid supply member, and / by a fluid pressure cylinder / only a fluid supply member of another side], and may be made as [hold / it / where a work before a grinding start and after an end of grinding is

adsorbed].

[0013]If a field which counters a field of a portion of a work which has come from between grinding stones of a fluid supply member outside in this device is correctly made perpendicular, Since non-contact support of the work can be carried out after carrying out adsorption maintenance of the work by a fluid supply member by a vertical state correctly, also in a noncontact state, a work can be kept exact in the perpendicular state.

[0014]

[Embodiment of the Invention]Hereafter, with reference to drawings, the double-sided grinding attachment of the sheet metal discoid work of this invention is explained.

[0015]Drawing 1 - drawing 4 show the double-sided grinding attachment of the sheet metal discoid work of a 1st embodiment in this invention. In the following explanation, front and rear, right and left shall be based on drawing 1, the right and left of drawing 1 are called right and left, the space side front of drawing 1 shall be called front, and the space back side shall be called back.

[0016]Grinding attachment (1) Level bed (2) Frame (3) with which the longitudinal dimension attached to the upper surface carried out the opening, and the opening for work supplies of provisions (3a) was opened in the upper surface And it has the base (4) and (5) of the right-and-left couple allotted so that a vertical plane might counter in a frame (3).

[0017]Frame (3) To a right-and-left inner surface, a grindstone head (6) and (7) penetrate the base (4) and (5) on either side, respectively, and it is attached in the shape of opposite. It is allotted so that the cylindrical grinding stone (8) and (9) extended to a longitudinal direction may counter the opposed face of a grindstone head (6) and (7) in the circular grinding sides of the end face, and so that the axis of each grinding stone (8) and (9) may be located on the same straight line. Although the graphic display was omitted, in a grindstone head (6) and (7), the slewing mechanism made to rotate the axial movement device and the grinding stone (8) and (9) which are made to move the grinding stone (8) and (9) to a longitudinal direction to the circumference of an axis is formed, respectively. At the time of un-grinding, the mutual interval of a grinding stone (8) and (9) of the grinding stone (8) and (9) is a work (w). It is made as [locate / in the position in readiness which becomes larger than thickness].

[0018]Left base (4) Right-hand side and right base (5) The fluid supply member (10) and (11) of the couple is formed in left-hand side in the shape of opposite, respectively. The fluid supply member (10) and (11) A short cylindrical member (10e) (11e), Notching (10c) which is constituted by the lid member (10f) (11f) which plugs up the opening of this, and makes disc-like [which has an axis extended to a longitudinal direction as a whole, respectively] and to which the grinding stone (8) and (9) may be located in the lower part, respectively is formed. A ** object blows off to the fluid supply member (10) and (11), and many holes (10a) (11a) are provided, respectively. Each hole (10a) (11a) is connected via the space (10b) (11b) provided in a supply member (10) and (11), and This space (10b) (11b), The fluid supply unit which the graphic display omitted is connected, respectively, and a fluid blows off from each hole (10a) (11a). Two or more work suction holes (10d) are opened in the left fluid supply member (10). This hole (10d) is connected via the space (10b) in which a ** object blows off and which connects a hole (10a) in a supply member (10), and the separated space (10g), Suitable vacuum suction devices, such as a vacuum pump which is not illustrated via a communication trunk (23) to this

space (10g), are connected.

[0019]And a left fluid supply member (10) is a left base (4). It is fixed to a right face, and on the other hand, as a right fluid supply member (11) is described below, it is provided in the longitudinal direction, enabling free movement.

[0020]The fluid supply member (11) is provided with the perpendicular tabular support member (12), the rod (13a) tip of two air cylinders (13) at which a support member (12) has a rod (13a) extended to a longitudinal direction -- attachment *****. An air cylinder (13) keeps an interval forward and backward, and is a base (5). To the pan currently fixed, to the right face of a support member (12). The cylindrical guidance member (14) extended to a longitudinal direction in a front lower corner and the Gokami corner is attached, and this guidance member (14) is a base (5). A fluid supply member (11) moves to a longitudinal direction correctly by penetrating enabling free sliding. In a support member (12), it is a grinding stone (9). The breakthrough (12a) for penetrating is opened. A right fluid supply member (11) is located in the position in readiness which is in the state whose rod (13a) of the air cylinder (13) cringed most at the time of un-grinding. The air cylinder (13) is connected to the compressed air supply source via the pressure regulating valve which is not illustrated, and the pressure in an air cylinder (13) is kept constant by the pressure regulating valve.

[0021]left base (4) **** -- the diameter direction support drive rotated in support of the work held by the fluid supply member (11) is formed in the diameter direction as follows.

[0022]Left base (4) A total of every two rollers [six] (15), (16), and (17) located at a right face before and after the surroundings of a between [a fluid supply member (10) and (11)] is provided in the bottom in upwards, respectively. Each roller (15), (16), and (17). It can rotate freely to the circumference of the horizontal axis extended to a longitudinal direction, the mutual interval of two lower rollers (15) is still smaller than the mutual interval of two inner rollers (16), and it is a work (w) of a vertical state by these four rollers (15) and (16). Popularity is won and it can support now.

[0023]Two inner rollers (16) are driving rollers, and are left bases (4). It drives via a belt (19) with the attached electric motor (22). Two lower rollers (15) are follower rollers. Although two upper rollers (17) are presser-foot rollers and the graphic display was omitted, For example, it can move now forward and backward with moving systems, such as an air cylinder, and the presser-foot roller (17) can take now the position in readiness where the mutual interval of a roller (17) becomes larger than the diameter of a work.

[0024]Work (w) in grinding attachment although the detailed graphic display was omitted The auto-loader (21) as a works-carrying-in appearance means for performing carrying in and taking out automatically is a frame (3). It is provided up.

[0025]In this grinding attachment, it is a work (w). It compares with a diameter, the diameter of a fluid supply member (10) and (11) is slightly small, and the diameter of a grinding stone (8) and (9) is smaller than the diameter of a fluid supply member (10) and (11).

[0026]Grinding attachment (1) which has such composition It sets, a presser-foot roller (17), a grinding stone (8), (9), and a right fluid supply member (11) are in the state which took the position in readiness, respectively, and it is a work (w). It is carried on a driving roller (16) and a follower roller (15) with a perpendicular posture. Next, vacuum suction of the left inside of a fluid supply member (10) is carried out, and it is a work (w). It is

drawn in by the right face of a left fluid supply member (10), it is adsorbed, and it is kept exact in the perpendicular state. At this time, it is a work (w). The portion of an upper part abbreviation half is located between a fluid supply member (10) and (11). And work (w) The upper part has projected up from the fluid supply member (10) and (11) slightly, it presses down so that a part of this portion of a work (w) may be pressed down, and the mutual interval between rollers (17) is adjusted.

[0027]And when a left fluid supply member (10) and vacuum suction device are intercepted, immediately fluids, such as air or coolant, from a fluid supply member (10) on either side and (11), Work (w) located between a fluid supply member (10) and (11) Work (w) which has come from between a portion (8), i.e., a grinding stone, and (9) outside The processed surface of both sides of a portion is supplied and it is a work (w). It is supported by the grinding position. The rod (13a) of an air cylinder (13) is extended simultaneously, a right fluid supply member (11) moves leftward, the static pressure between a fluid supply member (10) and (11) is made by the predetermined value, and it is a work (w) by the static pressure. Non-contact support is carried out by a vertical state. [0028]In the above-mentioned state, a driving roller (16) starts rotation, and they are a driving roller (16) and a work (w). It is a work (w) by the frictional force between peripheries. It rotates. Work (w) If a time is started, the grinding stone (8) and (9) on either side will be rotated. It moves toward the grinding stone (8) of another side, and (9), respectively, and the portion of the work (w) bottom is caught with the grinding stone (8) and (9) at the same time the grinding stone (8) and (9) on either side is rotated. Thus, work (w) A periphery intersects the periphery of the grinding side of a grinding stone (8) and (9), and it is a work (w). A center is located in the grinding side of a grinding stone (8) and (9).

[0029]It is a work (w) in this state. It is a work (w) while making one revolution. The double-sided whole processed surface surface passes through between the grinding sides of a grinding stone (8) and (9). Right grinding stone (9) It moves to the left gradually with advance of grinding. On the other hand, it is a left grinding stone (8). It is a work (w) to the beginning. It does not move from the inserted position. And right grinding stone (9) Left grinding stone (8) A mutual interval is a work (w). A predetermined time stop is carried out in the position used as the value which becomes settled with result thickness, and spark-out grinding is performed. And work (w) It is ground from the thickness at the time of carrying in to predetermined thickness.

[0030]Work (w) Since the pressure in an air cylinder (13) is kept constant when ground, Work (w) When the static pressure between a fluid supply member (10) and (11) becomes low with reduction in thickness, the rod (13a) of an air cylinder (13) is a work (w) immediately. Only the decrement of thickness is extended and the static pressure between a fluid supply member (10) and (11) is returned to a predetermined value. Since it is carried out without this operation almost producing time difference, a static pressure is kept constant on parenchyma.

[0031]work (w) if grinding is completed -- a grinding stone (8) and (9) -- work (w) from - it separates and moves to a position in readiness. a grinding stone (8) and (9) -- work (w) from -- if it separates, a driving roller (16) will be stopped -- this -- work (w) Rotation is suspended. Work (w) A stop of rotation will suspend supply of the fluid from a fluid supply member (10) and (11). Simultaneously with this, it is a work (w). It is drawn in by the right face of a left fluid supply member (10). And work (w) Rising wood

is held by a loader (21) and a presser-foot roller (17) and a right fluid supply member (11) move to a position in readiness, respectively. And work (w) It is raised upwards by a loader (21) and is grinding attachment (1). It is taken out outside. This operation is repeated and grinding is performed one after another.

[0032]The above-mentioned grinding attachment (1) If one grinding stone (it is a left grinding stone (8) in the above-mentioned embodiment) is stopped, and it is considered as a standard like and made to move the grinding stone (it is a right grinding stone (9) in the above-mentioned embodiment) of another side, Since it can grind on the basis of the grinding side of one grinding stone, the accuracy of grinding becomes high.

[0033]If one fluid supply member (it is a right fluid supply member (11) in the above-mentioned embodiment) is moved, the fluid supply member (it is a left fluid supply member (10) in the above-mentioned embodiment) of another side is fixed and a static pressure is kept constant, Composition of a device can be simplified while being able to keep a static pressure constant in high accuracy.

[0034]Work (w) Carrying-in appearance and work (w) The procedure to support is not restricted to the procedure of the above-mentioned explanation.

[0035]Next, with reference to drawing 5 and drawing 6, the double-sided grinding attachment of a 2nd embodiment in this invention is explained. Identical codes are given to the same thing as what was shown in the grinding attachment in a 1st embodiment in the following explanation, and identical parts, and explanation is omitted. In the following explanation, the right and left of drawing 5 shall be called right and left.

[0036]This grinding attachment (20) is a base (4). And the mounting means and diameter direction support driving means of the fluid supply member (25) and (26) to a support member (12) differ from each other.

[0037]A left fluid supply member (25) is a base (4). The right fluid supply member (26) is attached to the field for the rights as follows at the support member (12), respectively.

[0038]An interval is kept in a hoop direction at the fluid supply member (25) and (26) on either side, and three breakthroughs (25a) (26a) are formed. About the breakthrough (25a) of a left fluid supply member (25), it is a base (4). Three stud bolts (30) in which three screwed-in stud bolts (29) were thrust into the support member (12) in the breakthrough (26a) of the right fluid supply member (26) have penetrated, respectively. And the right and left of the fluid supply member (25) in a stud bolt (29) and (30) and (26) **** a nut (31) via a spherical washer (36), respectively. It is a left fluid supply member (25) and base (4) by rotating a nut (31). It is adjusted so that an interval and the interval of a right fluid supply member (26) and a support member (12) may become the same, respectively, The fluid supply member (25) and (26) is kept exact in the perpendicular state.

[0039]In this embodiment, it is a work (w). The diameter direction support driving means made to rotate in support of a diameter direction is formed as follows.

[0040]While making perpendicular disc-like between a fluid supply member (25) on either side and (26), it is a work (w) to a center. Work ** ON ***** (33) in which the hole (33d) inserted in was made is provided. Three support rollers (32) which insert in and rotate to the circumference of the horizontal axis in which a member (33) is extended to a longitudinal direction are bases (4). It is attached, and it inserts in with this roller (32) and the member (33) is supported. A support roller (32) is inserted in, sets regular intervals to the hoop direction of a member (33), and is arranged on it.

[0041]Work ** ON ***** (33) consists of a thick ***** edge part (33a) where the cog in a wheel was cut by the periphery, and a work attaching part (33b) projected to the radial inner side from now on. The thickness of a work attaching part (33b) is a work (w). It is thinner than thickness. In this embodiment, it is constituted by member with another edge part (33a) and work attaching part (33b), and the edge part (33a) and the work attaching part (33b) are screwed mutually.

[0042]The gear tooth of an edge part (33a) is a base (4). It gears with the gear fixed to the motor shaft of the attached drive motor (34), and with a drive motor (34), it inserts in and a member (33) rotates to shaft orientations.

[0043]The projected part (33c) projected toward the radial inner side is formed in the common-law marriage part of a work attaching part (33b). This projected part (33c) is a work (w). It conforms to the shape of notching (wa) called what is called a notch formed in the edge part.

[0044]It is a work (w) as follows by the loader (35) formed a little above the right-hand side from the center of the device (20) in this grinding attachment (20). Carrying-in appearance is performed.

[0045]A loader (35) is a work (w) so that it may have a sucker (35a) and notching (wa) may be located in this sucker (35a) in a position and this device at the upper part. It adsorbs. On the other hand, work ** ON ***** (33) has taken the state where the projected part (33c) of a work attaching part (33b) comes to the upper part.

[0046]A loader (35) descends in the state where the position in readiness is taken, respectively, and a grinding stone (8), (9), and a right fluid supply member (26) are the center and work (w) of a hole (33d) of an attaching part (33b). It is located on the horizontal line to which a center is extended to the same longitudinal direction. Next, a loader (35) moves leftward and it is a work (w). A work (w) is inserted in a hole (33d) so that the projected part (33c) of an attaching part (33b) may fit into notching (wa). This posterior sucker (35a) to work (w) It separates and a loader (35) moves to the upper right direction of grinding attachment (20). Work (w) Taking out is carried out to an above-mentioned procedure and reverse.

[0047]The procedure in which a grinding stone (8), (9), and a right fluid supply member (26) move, and grinding is performed is the same as the case of the grinding attachment of a 1st embodiment.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the double-sided grinding attachment of a sheet metal discoid work, and the device which grinds simultaneously both sides of sheet metal discoid works, such as a semiconductor wafer, still more detailed, for example.

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PRIOR ART

[Description of the Prior Art] As a device which grinds both sides of a sheet metal discoid work simultaneously, JP, 10-217079, A has a thing of a statement, for example.

[0003] The perpendicular disc-like grinding stone of a couple with which this grinding attachment keeps an interval in right and left at the upper surface of a level bed and a bed, it is provided, and the field which countered is made with a grinding side, respectively. While both sides of a sheet metal perpendicular discoid work counter the grinding side of a grinding stone, respectively, it has the work piece rotating device which makes the grinding position between grinding sides rotate in support of a work so that the periphery of a work may intersect the periphery of a grinding side and the center of a work may be located in a grinding side.

[0004] The work piece rotating device is provided with the direction means for supporting of a static pressure shaft which supply a fluid to both sides of the portion of the work which has come from between grinding stones outside, and carry out non-contact support of the work with the static pressure in shaft orientations, and the diameter direction support drive which a diameter direction is made to rotate in support of a work.

[0005] It has the support block with which the slit which can insert a work was formed, fluids, such as air, blow off from both sides of the block which forms a slit, and the direction means for supporting of a static pressure shaft are made as [support / by the static pressure produced with this fluid / a work].

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EFFECT OF THE INVENTION

[The means for solving a technical problem and an effect of the invention] In order to solve an aforementioned problem, the double-sided grinding attachment of the sheet metal discoid work of this invention, One pair of grinding stones which are arranged and are rotated so that it can move relatively to shaft orientations, while the circular grinding sides of the end face counter, While the processed surface of both sides of a sheet metal discoid work counters the grinding side of one pair of said grinding stones, respectively. It has the work rotation means which makes the grinding position between said grinding sides rotate in support of said work so that the periphery of said work may intersect the periphery of said grinding side and the center of said work may be located in said grinding side.

The static pressure type axial supporting means which said work rotation means supplies a fluid to the processed surface of both sides of the portion of the work which has come from between said grinding stones outside, and carries out non-contact support of said work with the static pressure in shaft orientations, In the double-sided grinding attachment of a sheet metal discoid work provided with the diameter direction support driving means which makes a diameter direction rotate in support of said work, it has the static pressure control means to which a static pressure type axial supporting means keeps a static pressure constant corresponding to reduction of the thickness of the work accompanying advance of grinding.

[0009]In double-sided grinding attachment of this sheet metal discoid work, since a value of a static pressure which is not concerned with change of thickness of a work but holds a work is kept constant, both sides of a sheet metal discoid work can be ground in high accuracy.

[0010]In double-sided grinding attachment of the above and a sheet metal discoid work, a static pressure type axial supporting means, It has a fluid supply member of a couple which has a field which counters a field of a portion of a work which has come from between said grinding stones outside, respectively, A static pressure control means has a transportation device which moves at least one fluid supply member to shaft orientations of a work, When a transportation device has a fluid pressure cylinder and a rod of said fluid pressure cylinder is extended corresponding to reduction of thickness of a work accompanying advance of grinding, at least one fluid supply member moves to shaft orientations of a work, and it may be made as [keep / a static pressure / constant].

[0011]In this device, while a static pressure control means is realizable with simple composition, a static pressure can be easily kept constant, and control of a static pressure can be ensured. .

[0012]It may be made as [move / the above-mentioned double-sided grinding attachment is provided with a vacuum suction device connected to one fluid supply member, and / by a fluid pressure cylinder / only a fluid supply member of another side], and may be made as [hold / it / where a work before a grinding start and after an end of grinding is adsorbed].

[0013]If a field which counters a field of a portion of a work which has come from between grinding stones of a fluid supply member outside in this device is correctly made perpendicular, Since non-contact support of the work can be carried out after carrying out adsorption maintenance of the work by a fluid supply member by a vertical state correctly, also in a noncontact state, a work can be kept exact in the perpendicular state.

[0014]

[Embodiment of the Invention]Hereafter, with reference to drawings, the double-sided grinding attachment of the sheet metal discoid work of this invention is explained.

[0015]Drawing 1 - drawing 4 show the double-sided grinding attachment of the sheet metal discoid work of a 1st embodiment in this invention. In the following explanation, front and rear, right and left shall be based on drawing 1, the right and left of drawing 1 are called right and left, the space side front of drawing 1 shall be called front, and the space back side shall be called back.

[0016]Grinding attachment (1) Level bed (2) Frame (3) with which the longitudinal dimension attached to the upper surface carried out the opening, and the opening for work supplies of provisions (3a) was opened in the upper surface And it has the base (4) and (5) of the right-and-left couple allotted so that a vertical plane might counter in a frame (3).

[0017]Frame (3) To a right-and-left inner surface, a grindstone head (6) and (7) penetrate the base (4) and (5) on either side, respectively, and it is attached in the shape of opposite. It is allotted so that the cylindrical grinding stone (8) and (9) extended to a longitudinal direction may counter the opposed face of a grindstone head (6) and (7) in the circular grinding sides of the end face, and so that the axis of each grinding stone (8) and (9) may be located on the same straight line. Although the graphic display was omitted, in a grindstone head (6) and (7), the slewing mechanism made to rotate the axial movement device and the grinding stone (8) and (9) which are made to move the grinding stone (8) and (9) to a longitudinal direction to the circumference of an axis is formed, respectively. At the time of un-grinding, the mutual interval of a grinding stone (8) and (9) of the grinding stone (8) and (9) is a work (w). It is made as [locate / in the position in readiness which becomes larger than thickness].

[0018]Left base (4) Right-hand side and right base (5) The fluid supply member (10) and (11) of the couple is formed in left-hand side in the shape of opposite, respectively. The fluid supply member (10) and (11) A short cylindrical member (10e) (11e), Notching (10c) which is constituted by the lid member (10f) (11f) which plugs up the opening of this, and makes disc-like [which has an axis extended to a longitudinal direction as a whole, respectively] and to which the grinding stone (8) and (9) may be located in the lower part, respectively is formed. A ** object blows off to the fluid supply member (10) and (11), and many holes (10a) (11a) are provided, respectively. Each hole (10a) (11a) is

connected via the space (10b) (11b) provided in a supply member (10) and (11), and This space (10b) (11b). The fluid supply unit which the graphic display omitted is connected, respectively, and a fluid blows off from each hole (10a) (11a). Two or more work suction holes (10d) are opened in the left fluid supply member (10). This hole (10d) is connected via the space (10b) in which a ** object blows off and which connects a hole (10a) in a supply member (10), and the separated space (10g), Suitable vacuum suction devices, such as a vacuum pump which is not illustrated via a communication trunk (23) to this space (10g), are connected.

[0019]And a left fluid supply member (10) is a left base (4). It is fixed to a right face, and on the other hand, as a right fluid supply member (11) is described below, it is provided in the longitudinal direction, enabling free movement.

[0020]The fluid supply member (11) is provided with the perpendicular tabular support member (12), the rod (13a) tip of two air cylinders (13) at which a support member (12) has a rod (13a) extended to a longitudinal direction -- attachment ***** . An air cylinder (13) keeps an interval forward and backward, and is a base (5). To the pan currently fixed, to the right face of a support member (12). The cylindrical guidance member (14) extended to a longitudinal direction in a front lower corner and the Gokami corner is attached, and this guidance member (14) is a base (5). A fluid supply member (11) moves to a longitudinal direction correctly by penetrating enabling free sliding. In a support member (12), it is a grinding stone (9). The breakthrough (12a) for penetrating is opened. A right fluid supply member (11) is located in the position in readiness which is in the state whose rod (13a) of the air cylinder (13) cringed most at the time of un-grinding. The air cylinder (13) is connected to the compressed air supply source via the pressure regulating valve which is not illustrated, and the pressure in an air cylinder (13) is kept constant by the pressure regulating valve.

[0021]left base (4) **** -- the diameter direction support drive rotated in support of the work held by the fluid supply member (11) is formed in the diameter direction as follows.

[0022]Left base (4) A total of every two rollers [six] (15), (16), and (17) located at a right face before and after the surroundings of a between [a fluid supply member (10) and (11)] is provided in the bottom in upwards, respectively. Each roller (15), (16), and (17). It can rotate freely to the circumference of the horizontal axis extended to a longitudinal direction, the mutual interval of two lower rollers (15) is still smaller than the mutual interval of two inner rollers (16), and it is a work (w) of a vertical state by these four rollers (15) and (16). Popularity is won and it can support now.

[0023]Two inner rollers (16) are driving rollers, and are left bases (4). It drives via a belt (19) with the attached electric motor (22). Two lower rollers (15) are follower rollers. Although two upper rollers (17) are presser-foot rollers and the graphic display was omitted, For example, it can move now forward and backward with moving systems, such as an air cylinder, and the presser-foot roller (17) can take now the position in readiness where the mutual interval of a roller (17) becomes larger than the diameter of a work.

[0024]Work (w) in grinding attachment although the detailed graphic display was omitted The auto-loader (21) as a works-carrying-in appearance means for performing carrying in and taking out automatically is a frame (3). It is provided up.

[0025]In this grinding attachment, it is a work (w). It compares with a diameter, the diameter of a fluid supply member (10) and (11) is slightly small, and the diameter of a

grinding stone (8) and (9) is smaller than the diameter of a fluid supply member (10) and (11).

[0026]Grinding attachment (1) which has such composition It sets, a presser-foot roller (17), a grinding stone (8), (9), and a right fluid supply member (11) are in the state which took the position in readiness, respectively, and it is a work (w). It is carried on a driving roller (16) and a follower roller (15) with a perpendicular posture. Next, vacuum suction of the left inside of a fluid supply member (10) is carried out, and it is a work (w). It is drawn in by the right face of a left fluid supply member (10), it is adsorbed, and it is kept exact in the perpendicular state. At this time, it is a work (w). The portion of an upper part abbreviation half is located between a fluid supply member (10) and (11). And work (w) The upper part has projected up from the fluid supply member (10) and (11) slightly, it presses down so that a part of this portion of a work (w) may be pressed down, and the mutual interval between rollers (17) is adjusted.

[0027]And when a left fluid supply member (10) and vacuum suction device are intercepted, immediately fluids, such as air or coolant, from a fluid supply member (10) on either side and (11), Work (w) located between a fluid supply member (10) and (11) Work (w) which has come from between a portion (8), i.e., a grinding stone, and (9) outside The processed surface of both sides of a portion is supplied and it is a work (w). It is supported by the grinding position. The rod (13a) of an air cylinder (13) is extended simultaneously, a right fluid supply member (11) moves leftward, the static pressure between a fluid supply member (10) and (11) is made by the predetermined value, and it is a work (w) by the static pressure. Non-contact support is carried out by a vertical state. [0028]In the above-mentioned state, a driving roller (16) starts rotation, and they are a driving roller (16) and a work (w). It is a work (w) by the frictional force between peripheries. It rotates. Work (w) If a time is started, the grinding stone (8) and (9) on either side will be rotated. It moves toward the grinding stone (8) of another side, and (9), respectively, and the portion of the work (w) bottom is caught with the grinding stone (8) and (9) at the same time the grinding stone (8) and (9) on either side is rotated. Thus, work (w) A periphery intersects the periphery of the grinding side of a grinding stone (8) and (9), and it is a work (w). A center is located in the grinding side of a grinding stone (8) and (9).

[0029]It is a work (w) in this state. It is a work (w) while making one revolution. The double-sided whole processed surface surface passes through between the grinding sides of a grinding stone (8) and (9). Right grinding stone (9) It moves to the left gradually with advance of grinding. On the other hand, it is a left grinding stone (8). It is a work (w) to the beginning. It does not move from the inserted position. And right grinding stone (9) Left grinding stone (8) A mutual interval is a work (w). A predetermined time stop is carried out in the position used as the value which becomes settled with result thickness, and spark-out grinding is performed. And work (w) It is ground from the thickness at the time of carrying in to predetermined thickness.

[0030]Work (w) Since the pressure in an air cylinder (13) is kept constant when ground, Work (w) When the static pressure between a fluid supply member (10) and (11) becomes low with reduction in thickness, the rod (13a) of an air cylinder (13) is a work (w) immediately. Only the decrement of thickness is extended and the static pressure between a fluid supply member (10) and (11) is returned to a predetermined value. Since it is carried out without this operation almost producing time difference, a static pressure

is kept constant on parenchyma.

[0031]work (w) if grinding is completed -- a grinding stone (8) and (9) -- work (w) from - it separates and moves to a position in readiness, a grinding stone (8) and (9) -- work (w) from -- if it separates, a driving roller (16) will be stopped -- this -- work (w) Rotation is suspended. Work (w) A stop of rotation will suspend supply of the fluid from a fluid supply member (10) and (11). Simultaneously with this, it is a work (w). It is drawn in by the right face of a left fluid supply member (10). And work (w) Rising wood is held by a loader (21) and a presser-foot roller (17) and a right fluid supply member (11) move to a position in readiness, respectively. And work (w) It is raised upwards by a loader (21) and is grinding attachment (1). It is taken out outside. This operation is repeated and grinding is performed one after another.

[0032]The above-mentioned grinding attachment (1) If one grinding stone (it is a left grinding stone (8) in the above-mentioned embodiment) is stopped, and it is considered as a standard like and made to move the grinding stone (it is a right grinding stone (9) in the above-mentioned embodiment) of another side, Since it can grind on the basis of the grinding side of one grinding stone, the accuracy of grinding becomes high.

[0033]If one fluid supply member (it is a right fluid supply member (11) in the above-mentioned embodiment) is moved, the fluid supply member (it is a left fluid supply member (10) in the above-mentioned embodiment) of another side is fixed and a static pressure is kept constant, Composition of a device can be simplified while being able to keep a static pressure constant in high accuracy.

[0034]Work (w) Carrying-in appearance and work (w) The procedure to support is not restricted to the procedure of the above-mentioned explanation.

[0035]Next, with reference to drawing 5 and drawing 6, the double-sided grinding attachment of a 2nd embodiment in this invention is explained. Identical codes are given to the same thing as what was shown in the grinding attachment in a 1st embodiment in the following explanation, and identical parts, and explanation is omitted. In the following explanation, the right and left of drawing 5 shall be called right and left.

[0036]This grinding attachment (20) is a base (4). And the mounting means and diameter direction support driving means of the fluid supply member (25) and (26) to a support member (12) differ from each other.

[0037]A left fluid supply member (25) is a base (4). The right fluid supply member (26) is attached to the field for the rights as follows at the support member (12), respectively.

[0038]An interval is kept in a hoop direction at the fluid supply member (25) and (26) on either side, and three breakthroughs (25a) (26a) are formed. About the breakthrough (25a) of a left fluid supply member (25), it is a base (4). Three stud bolts (30) in which three screwed-in stud bolts (29) were thrust into the support member (12) in the breakthrough (26a) of the right fluid supply member (26) have penetrated, respectively. And the right and left of the fluid supply member (25) in a stud bolt (29) and (30) and (26) **** a nut (31) via a spherical washer (36), respectively. It is a left fluid supply member (25) and base (4) by rotating a nut (31). It is adjusted so that an interval and the interval of a right fluid supply member (26) and a support member (12) may become the same, respectively. The fluid supply member (25) and (26) is kept exact in the perpendicular state.

[0039]In this embodiment, it is a work (w). The diameter direction support driving means made to rotate in support of a diameter direction is formed as follows.

[0040]While making perpendicular disc-like between a fluid supply member (25) on either side and (26), it is a work (w) to a center. Work ** ON ***** (33) in which the hole (33d) inserted in was made is provided. Three support rollers (32) which insert in and rotate to the circumference of the horizontal axis in which a member (33) is extended to a longitudinal direction are bases (4). It is attached, and it inserts in with this roller (32) and the member (33) is supported. A support roller (32) is inserted in, sets regular intervals to the hoop direction of a member (33), and is arranged on it.

[0041]Work ** ON ***** (33) consists of a thick ***** edge part (33a) where the cog in a wheel was cut by the periphery, and a work attaching part (33b) projected to the radial inner side from now on. The thickness of a work attaching part (33b) is a work (w). It is thinner than thickness. In this embodiment, it is constituted by member with another edge part (33a) and work attaching part (33b), and the edge part (33a) and the work attaching part (33b) are screwed mutually.

[0042]The gear tooth of an edge part (33a) is a base (4). It gears with the gear fixed to the motor shaft of the attached drive motor (34), and with a drive motor (34), it inserts in and a member (33) rotates to shaft orientations.

[0043]The projected part (33c) projected toward the radial inner side is formed in the common-law marriage part of a work attaching part (33b). This projected part (33c) is a work (w). It conforms to the shape of notching (wa) called what is called a notch formed in the edge part.

[0044]It is a work (w) as follows by the loader (35) formed a little above the right-hand side from the center of the device (20) in this grinding attachment (20). Carrying-in appearance is performed.

[0045]A loader (35) is a work (w) so that it may have a sucker (35a) and notching (wa) may be located in this sucker (35a) in a position and this device at the upper part. It adsorbs. On the other hand, work ** ON ***** (33) has taken the state where the projected part (33c) of a work attaching part (33b) comes to the upper part.

[0046]A loader (35) descends in the state where the position in readiness is taken, respectively, and a grinding stone (8), (9), and a right fluid supply member (26) are the center and work (w) of a hole (33d) of an attaching part (33b). It is located on the horizontal line to which a center is extended to the same longitudinal direction. Next, a loader (35) moves leftward and it is a work (w). A work (w) is inserted in a hole (33d) so that the projected part (33c) of an attaching part (33b) may fit into notching (wa). This posterior sucker (35a) to work (w) It separates and a loader (35) moves to the upper right direction of grinding attachment (20). Work (w) Taking out is carried out to an above-mentioned procedure and reverse.

[0047]The procedure in which a grinding stone (8), (9), and a right fluid supply member (26) move, and grinding is performed is the same as the case of the grinding attachment of a 1st embodiment.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional grinding attachment, it cannot respond to change of the thickness of the work accompanying grinding. That is, since a static pressure will become low and a work will become unstable if grinding advances and the thickness of a work decreases, there is a problem that the grinding accuracy of a work becomes low and the flatness of the processed surface of a work becomes low.

[0007] The purpose of this invention is to provide the double-sided grinding attachment of the sheet metal discoid work which makes it a technical problem to solve the above-mentioned problem, and is not concerned with reduction of the thickness of a work, but can grind in high accuracy.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a partial notching front view of the double-sided grinding attachment of the sheet metal discoid work of a 1st embodiment in this invention.

[Drawing 2] It is an expanded sectional view of the important section of the double-sided grinding attachment of the sheet metal discoid work.

[Drawing 3] It is a side view of the double-sided grinding attachment of the sheet metal discoid work.

[Drawing 4] It is a perspective view of the important section of the double-sided grinding attachment of the sheet metal discoid work.

[Drawing 5]the business in the double-sided grinding attachment of the sheet metal disc-like work of a 2nd embodiment in this invention -- it is a front view of a part.

[Drawing 6]It is a side view of the double-sided grinding attachment.

[Description of Notations]

- (1) Grinding attachment
- (8) and (9) Grinding stone
- (10) and (11) Fluid supply member
- (13) Air cylinder
- (13a) Rod
- (20) Grinding attachment
- (25) and (26) Fluid supply member
- (w) Work

[Translation done.]

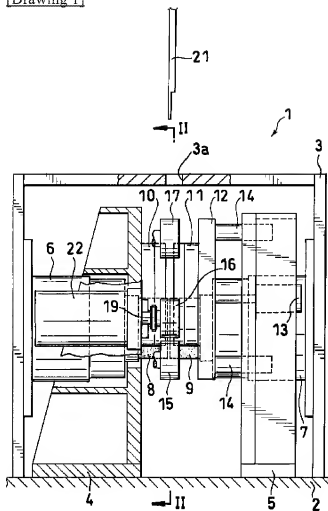
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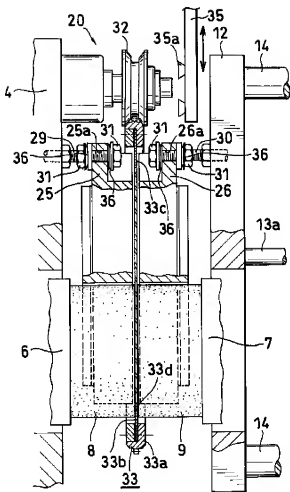
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DRAWINGS

[Drawing 1]



[Drawing 2]



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CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the regulation of 2 of Article 17 of Patent Law

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[Written amendment]
[Filing date] February 13, Heisei 16 (2004.2.13)
[Amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] 0028
[Method of Amendment] Change
[The contents of amendment]
[0028]

In the above-mentioned state, a driving roller (16) starts rotation and a work (w) rotates according to the frictional force between a driving roller (16) and the periphery of a work (w). If a work (w) starts rotation, the grinding stone (8) and (9) on either side will be rotated. It moves toward the grinding stone (8) of another side, and (9), respectively, and the portion of the work (w) bottom is caught with the grinding stone (8) and (9) at the same time the grinding stone (8) and (9) on either side is rotated. Thus, the periphery of a work (w) intersects the periphery of the grinding side of a grinding stone (8) and (9), and the center of a work (w) is located in the grinding side of a grinding stone (8) and (9).

[Amendment 2]
[Document to be Amended] Specification
[Item(s) to be Amended] Brief explanation of the drawings
[Method of Amendment] Change
[The contents of amendment]
[Brief Description of the Drawings]

[Drawing 1] It is a partial notching front view of the double-sided grinding attachment of the sheet metal discoid work of a 1st embodiment in this invention.

[Drawing 2] It is a sectional view so at the II-II line of drawing 1.

[Drawing 3] It is an expanded sectional view of the important section of the double-sided grinding attachment of the sheet metal discoid work.

[Drawing 4] It is a perspective view of the important section of the double-sided grinding attachment of the sheet metal discoid work.

[Drawing 5] It is a front view of the important section in the double-sided grinding attachment of the sheet metal disc-like work of a 2nd embodiment in this invention.

[Drawing 6] It is a side view of the important section of the double-sided grinding attachment.

[Description of Notations]

- (1) Grinding attachment
- (8) and (9) Grinding stone
- (10) and (11) Fluid supply member
- (13) Air cylinder
- (13a) Rod
- (20) Grinding attachment
- (25) and (26) Fluid supply member
- (w) Work

[Translation done.]